Induction of out-of-season spawning in Eurasian perch Perca fluviatilis: effects of rates of cooling and cooling durations on female gametogenesis and spawning

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Abstract	This study was designed to determine the influence of different thermal conditions during an out-of-season reproductive cycle on gonad recrudescence, plasma steroid levels (testosterone and estradiol), vitellogenin (VTG) concentrations and spawning in Eurasian perch (Perca fluviatilis) females. The experiment was performed in 450-1 square polyester indoor tanks located in two rooms equipped with controlled light and temperature devices. Four thermal regimes were tested with two different rates of cooling from 21 to 6 degreesC, 3 weeks (3w) or 6 weeks (6w), and two different durations at 6 degreesC, 3 months (3m) or 5 months (5m). The photoperiod was fixed at LD 12:12. A long cooling period (6w) resulted in greater gonadosomatic index (GSI) (3.6 +/- 0.5%) correlated with a larger oocyte diameter (787.9 +/- 25.1 mum). The plasma levels of testosterone (13.63 +/- 1.18 ng ml(-1)) in the former groups were higher than in the short cooling period groups (6.82 +/- 0.9 ng ml(-1)). A longer duration at 6 degreesC (5m) resulted in higher GSI (14.8 +/-1%), plasma testosterone levels (26.2 +/- 0.4 ng ml(-1)) and plasma protein phosphorus (PPP, 1.33 +/- 0.3 mug ml(-1)). The fish from the 6w 5m batch showed the highest plasma estradiol and testosterone levels, whereas the 3w 5m group showed the largest GSI. At the end of the experiment, several spontaneous out-of-season spawnings were collected in batch 6w 5m. Biopsy showed that most oocytes from groups 3w 5m and 6w 5m females were mature (migration of the germinal vesicle from central position), whereas few females showed a beginning of migration in groups 3w 3m and 6w 3m, suggesting that the gonad development and reproductive success of Eurasian perch mainly depends on the chilling duration (long cold period) rather than on the cooling one, in order to obtain out-of-season spawning. (C) 2002 Elsevier Science B.V. All rights reserved.
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